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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/936,324	12/04/2001	Kazutomo Higa	2001-1202A	4035

513 7590 07/15/2004

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 07/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary**Application No.**

09/936,324

Applicant(s)

HIGA, KAZUTOMO

Examiner

Sylvia R MacArthur

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 69-166 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 139-141 and 164-166 is/are allowed.
- 6) ☒ Claim(s) 69-91, 93-96, 98-102, 104-109, 111-118, 127-138, 142-158, and 160-163 is/are rejected.
- 7) ☒ Claim(s) 92,97,103,110,119-126 and 159 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/4/2001</u> . | 6) <input checked="" type="checkbox"/> Other: <u>approved proposed drawings</u> . |

DETAILED ACTION

Abstract

1. The abstract of the disclosure is objected to because of undue length. Correction is required. See MPEP § 608.01(b).

Drawings

2. The proposed drawing corrections have been approved. Applicant is advised to review the procedure cited below to ensure that these changes are made of record.

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

Replacement Drawing Sheets

Drawing changes must be made by presenting replacement figures which incorporate the desired changes and which comply with 37 CFR 1.84. An explanation of the changes made must be presented either in the drawing amendments, or remarks, section of the amendment. Any replacement drawing sheet must be identified in the top margin as "Replacement Sheet" and include all of the figures appearing on the immediate prior version of the sheet, even though only one figure may be amended. The figure or figure number of the amended drawing(s) must not be labeled as "amended." If the changes to the drawing figure(s) are not accepted by the examiner, applicant will be notified of any required corrective action in the next Office action. No further drawing submission will be required, unless applicant is notified.

Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin.

Annotated Drawing Sheets

A marked-up copy of any amended drawing figure, including annotations indicating the changes made, may be submitted or required by the examiner. The annotated drawing sheets must be clearly labeled as "Annotated Marked-up Drawings" and accompany the replacement sheets.

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Timing of Corrections

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.85(a). Failure to take corrective action within the set period will result in ABANDONMENT of the application.

If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings MUST be filed within the THREE MONTH shortened statutory period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136 for filing the corrected drawings after the mailing of a Notice of Allowability.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 78, 79, 84, and 146 are rejected under 35 U.S.C. 102(b) as being anticipated by Seki et al (US 5,169,477)

Regarding claim 78: Seki et al teaches an etching apparatus comprising a conveyor 46 (feed roller) for conveying printer circuit boards, a solvent pump 16 for pumping etching solution, a plurality of nozzles (manifolds 28 and 30) for spraying etching liquid, an oscillating motor (oscillation mechanism) 31.

Regarding claim 79: The oscillating mechanism 31 is inherently capable of varying the oscillating angle and oscillating speed according to the paragraph joining column 2 and 3 via a control board or console 52.

Regarding claim 84: The manifolds 28 and 30 anticipate the first treating booth while nozzles 28 and 30 anticipate the second treating booth.

Regarding claim 85: The apparatus resulting from the combined teachings of Seki or Shinko et al with Kreiselmaier and Kato is obviously capable of performing the optimization step discussed in these claims. The motivation to adjust the PRVs to accommodate the pressure of the various nozzle pipes is a matter of optimization. It would have been obvious to one of ordinary skill in the art of the claimed invention to adjust the PRVs to optimize the pressure of the nozzle pipes and thus control the flow of the treatment fluids.

4. Claims 78 and 79 are rejected under 35 U.S.C. 102(b) as being anticipated by Shinko (JP 05-309294).

Shinko teaches a feed roller (conveyance roller 3), a plurality of nozzle pipes (spraying pipes 4), control means 17 is provided as a means to control the oscillating mechanism of the nozzles according to section [011] of the English Translation, and a spray pump 7 is provided.

Regarding claim 79: The oscillating mechanism (controlled by element 17) is inherently capable of varying the oscillating angle and oscillating speed.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 69-72, 85 142, and 144 and 151 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko.

The teachings of Seki et al and Shinko were discussed above.

Both Seki et al and Shinko fail to teach that at least one of the nozzle pipes' or piping pipes' diameter differs in size from the others.

However, In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide nozzle pipes' or piping pipes' diameter differs in size from the others.

Regarding claim 85: The apparatus of Seki or Shinko et al is obviously capable of performing this optimization step. The motivation to adjust oscillating angle and speed in order to accommodate the flow pattern of the various nozzle pipes is a matter of optimization. It would have been obvious to one of ordinary skill in the art of the claimed invention to adjust oscillation speed and angle to optimize the pressure of the nozzle pipes and thus control the flow of the treatment fluids.

7. Claims 73, 74, 83, 86, 145, and 152 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Kato et al (US 3,706,398).

The teachings of Seki et al and Shinko were discussed above.

Both Seki et al and Shinko fail to teach pressure regulating valves (PRVs).

Kato teaches a fixed quantity fluid supply apparatus, wherein pressure regulating valves are 43 and 44 are utilized.

The motivation to provide pressure regulating valves in the apparatus of Seki et al or Shinko is that pressure regulating valves are well known suitable means of controlling or maintaining the pressure in the field of fluid supply systems.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide pressure regulating valves in order to maintain a uniform desired pressure during the manufacturing process of Seki et al or Shinko.

Regarding claim 83: Kato teaches pressure gauges 228 in order to monitor the pressure of the processing fluid.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide pressure gauges in the apparatus of Seki et al or Shinko.

Regarding claim 86: The apparatus resulting from the combined teachings of Seki or Shinko et al with Kato is obviously capable of performing the optimization step discussed in these claims. The motivation to adjust the PRVs to accommodate the pressure of the various nozzle pipes is a matter of optimization. It would have been obvious to one of ordinary skill in the art of the claimed invention to adjust the PRVs to optimize the pressure of the nozzle pipes and thus control the flow of the treatment fluids.

8. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Tamura et al (US 4,233,108) in further view of Koichi et al (JP 10-018058).

The teachings of Seki et al and Shinko were discussed above.

Seki et al and Shinko fail to teach flow rate regulating valves.

Tamura et al teaches flow rate regulating valves 6 coupled to solution feed pipes 7. The motivation to use a flow regulating valve is to enhance the control of the flow of processing fluid to the substrate. Thus, it would have been obvious at the time of the claimed invention to provide a flow regulating valve to control the flow of processing fluid to the substrate in the apparatus of Seki et al or Shinko.

Shinko fails to teach a flow meter.

Koichi teaches using a flow meter. Section [020] of the English Translation cites that the flowmeter 4 is used to measure the flow rate of the etching reagent this enhances process control. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a flow regulating valve and flowmeter in the apparatus of Seki et al or Shinko in view of Tamura and Koichi et al.

9. Claims 80, 81, 87, and 153 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Thoms (US 5,378,308).

The teachings of Seki et al and Shiko were discussed above.

Both fail to teach cams, links, and control motors at the nozzle pipes respectively.

Thoms teaches an etchant distribution apparatus wherein a motor 30 drives a crank 51(cam) which connects to arms (links) 52 and 57. The combination of crank and arms with pivotal plats 53 and 54 cause the nozzles to oscillate independently.

It is noted that the claim requires that there be motors disposed at a plurality of nozzle pipes. Nevertheless, it has been held in *In re Harza* 124USPQ 378 (CCPA 1960) that the duplication of parts is obvious. Thus, it would have been obvious at the time of the claimed invention to modify the apparatus of Seki et al or Shinko to have cam, links, and control motors as taught by Thoms.

Regarding claim 81: Col. 4 lines 7-53 of Thoms discusses that the oscillating angle of each of the nozzle pipes is varied by adjusting each of the cams and each of the link mechanisms.

Regarding claim 87: The duplication of parts was held to be obvious according to *In re Harza* 124USPQ 378 (CCPA 1960).

The apparatus of Seki or Shinko et al modified by Thoms is obviously capable of performing this optimization step. The motivation to adjust oscillating angle and speed in order to accommodate the flow pattern of the various nozzle pipes is a matter of optimization. It would have been obvious to one of ordinary skill in the art of the claimed invention to adjust oscillation speed and angle to optimize the pressure of the nozzle pipes and thus control the flow of the treatment fluids.

10. Claim 82 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Thoms applied to claims 80 and 81 above, and further in view of Rebold (US 6,066,834).

The teachings of Seki et al, Shinko and Thoms were discussed above.

All fail to teach that the oscillating mechanism comprises the circuits discussed in claim 82.

Rebold teaches an inverter circuit as a speed control device for DC motors. Rebold teaches in col.3 lines 28-37 that speed control circuits such as the inverter circuit (see the context of claim 7

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of Rebold) drives the motor at a constant speed regardless of the mechanical load imposed on the motor.

Thus, it would have been obvious for one of ordinary skill at the time of the claimed invention to modify the apparatus of Setki et al or Shinko in view of Thoms with the teachings of Rebold to control the speed of the motor which consequently control the oscillating speed of the nozzles.

11. Claim 84 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinko in view of Thoms (US 5,378,308).

The teachings of Shinko were discussed above.

Shinko fails to teach a first and second treatment booth.

Thoms teaches an etchant distribution apparatus with a plurality of treatment booths (coupled to elements 55 and 56 respectively) with each oscillating at a certain angle to a running direction of the printed wiring board or in reverse of that angle, see the abstract. Thoms explains that the treatment booths oscillating in this varied angle arrangement serves to ensure that the etchant is more uniformly distributed across the substrate. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a first and second treatment booth in the apparatus of Shinko.

12. Claims 88-90 and 147 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinko or Seki et al in view of Kreiselmaier (US 6,117,242).

The teachings of Shinko and Seki et al were discussed above.

Both fail to teach pressure-proof flexible tubes.

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Kreiselmaier teaches a device for internal coating of pipes. Col. 2 lines 33-41 teaches pressure-proof tubes are used in high pressure applications to ensure that the piping has necessary pressure resistance. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide pressure-proof tubes.

13. Claims 91, 100 – 102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Kreiselmaier as applied to claims 88-90 above, and further in view of Thoms.

The teachings of Seki et al, Shinko, and Kreiselmaier were discussed above. All fail to teach second support members.

Thoms teaches first support members 55 and 56, second support members 52 and 57, and a supporting mechanism 53b and 54b that support the second support members.

The motivation to provide the support structure of Thoms in the apparatus of Seki et al or Shinko modified by Kreiselmaier is to provide a more uniformly distributed etchant across the substrate as this apparatus enhances the coordination of the nozzles with movement of the substrate while ensuring that the varied flow regimes of the nozzles are accommodated by the pressure proof tubes. Thus, it would have been obvious to combine the teachings of Seki or Shinko with those of Kreiselmaier and Thoms.

Regarding claims 100 and 101: The crank 51 is provided as a moving means for the first and second support members linearly.

Regarding claim 102: Recall Shinko teaches a control means 17 this control means is obviously capable of controlling the oscillating mechanism resulting from the combined teachings of Shinko, Kreiselmaier and Thoms.

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14. Claim 93-95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Kreiselmaier as applied to claims 88-90 above, and further in view of Kato.

The teaching of Seki et al, Shinko, and Kreiselmaier are discussed above.

All fail to teach the pressure regulating valve and pressure gauges.

Kato teaches a fixed quantity fluid supply apparatus, wherein pressure regulating valves (PRVs) 43 and 44 are utilized.

The motivation to provide pressure regulating valves in the apparatus of Seki et al or Shinko is that pressure regulating valves are well known suitable means of process control in the field of fluid supply systems.

Regarding claim 83: Kato teaches pressure gauges 228 in order to monitor the pressure of the processing fluid.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide pressure regulating valves in order to maintain a uniform desired pressure during the manufacturing process of Seki et al or Shinko modified by Kreiselmaier.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide pressure gauges in the apparatus of Seki et al or Shinko and Kreiselmaier.

Recall the oscillating mechanisms of Seki et al and Shiko are inherently capable of oscillating the nozzle pipes independently and comprising oscillating angles and oscillating speeds that are variable.

15. Claim 96 and 98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Kreiselmaier as applied to claims 93-95 above, and further in view of Thoms.

The teachings of Seki et al, Shinko, and Kreiselmaier were discussed above. All failed to teach that their apparatus comprise cams, link mechanisms, and control motors. Thoms teaches an etchant distribution apparatus wherein a motor 30 drives a crank 51(cam) which connects to arms (links) 52 and 57. The combination of crank and arms with pivotal plates 53 and 54 cause the nozzles to oscillate independently.

Thus, it would have been obvious at the time of the claimed invention to modify the apparatus resulting from the combined teachings of Seki et al or Shinko, Kreiselmaier to have cam, links, and control motors as taught by Thoms.

16. Claim 99 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko, Kreiselmaier and Thoms as applied to claims 96 and 98 above, and further in view of Rebold.

The teachings of Seki et al, Shinko, Kreiselmaier, and Thoms were discussed above. All fail to teach that the oscillating mechanism comprises the circuits discussed in claim 99. Rebold teaches an inverter circuit as a speed control device for DC motors. Rebold teaches in col.3 lines 28-37 that speed control circuits such as the inverter circuit (see the context of claim 7 of Rebold) drives the motor at a constant speed regardless of the mechanical load imposed on the motor.

Thus, it would have been obvious for one of ordinary skill at the time of the claimed invention to modify the apparatus of Seki et al or Shinko in view of Kreiselmaier, and Thoms

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with the teachings of Rebold to control the speed of the motor which consequently control the oscillating speed of the nozzles.

17. Claims 76, 104-108, 143, and 154-156 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinko or Seki et al in view of Kreiselmaier (US 6,117,242) as applied to claims 88-90 above and further in view of Chih-Peng (US 6,270,620).

The teachings of Shinko or Seki et al and Kreiselmaier have been discussed above.

All fail to teach the treating solution being blown to the substrate.

Chih-Peng teaches an etching device wherein etchant nozzles 214, 224a, 224b, and 224c and air nozzles 226a are provided. Col. 5 lines 7-18 teaches that air is blown onto the substrate.

The motivation to provide a step of conveying the substrate while oscillating the nozzle pipes and blowing the treating solution to the substrate is that as cited in col. 6 lines 10-14 that the etchant is smoothly removed.

Thus, it would have been obvious to provide the step of blowing the treatment solution onto the substrate.

Regarding claim 106: Since the nozzle are able to oscillate independently at varied angles and speed the nozzles are obviously capable of meeting this limitation.

Regarding claims 107 and 108: The apparatus resulting from the combined teachings of Seki or Shinko et al Kreiselmaier and Kato is obviously capable of performing the optimization step discussed in these claims. The motivation to adjust the PRVs to accommodate the pressure of the various nozzle pipes is a matter of optimization. It would have been obvious to one of ordinary skill in the art of the claimed invention to adjust the PRVs to optimize the pressure of the nozzle pipes and thus control the flow of the treatment fluids.

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18. Claims 108, 109, 157, and 158 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinko or Seki et al in view of Kreiselmaier and Kato as applied to claims 93-95, 107, and 108 above and further in view of Chih-Peng (US 6,270,620).

The teachings of (Shinko or Seki et al) with Kreiselmaier and Kato have been discussed above.

All fail to teach the treating solution being blown to the substrate.

Chih-Peng teaches an etching device wherein etchant nozzles 214, 224a, 224b, and 224c and air nozzles 226a are provided. Col. 5 lines 7-18 teaches that air is blown onto the substrate.

The motivation to provide a step of conveying the substrate while oscillating the nozzle pipes and blowing the treating solution to the substrate is that as cited in col. 6 lines 10-14 that the etchant is smoothly removed.

Thus, it would have been obvious to provide the step of blowing the treatment solution onto the substrate.

The motivation to adjust the PRVs to accommodate the pressure of the various nozzle pipes is a matter of optimization.

It would have been obvious to one of ordinary skill in the art of the claimed invention to adjust the PRVs to optimize the pressure of the nozzle pipes and thus control the flow of the treatment fluids.

Recall the oscillating mechanisms of Seki et al and Shiko are inherently capable of oscillating the nozzle pipes independently and comprising oscillating angles and oscillating speeds that are variable.

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19. Claims 111-113, 117, 118, and 148 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Kato as applied to claims 73,74, and 83 above, and further in view of Rebold.

The teachings of Seki et al or Shinko in view of Kato was discussed above.

All fail to teach utilizing the circuits discussed in 111 to control the outputs of the pumps.

Rebold teaches an inverter circuit as a speed control device for DC motors. Rebold teaches in col.3 lines 28-37 that speed control circuits such as the inverter circuit (see the context of claim 7 of Rebold) drives the motor at a constant speed regardless of the mechanical load imposed on the motor.

Thus, it would have been obvious for one of ordinary skill at the time of the claimed invention to modify the apparatus of Seki et al or Shinko in view of Kato with the teachings of Rebold to control the speed of the motor in the pump which consequently controls the flow of the treating fluids.

Regarding claims 117 and 118:

All fail to specifically teach that the type of motor used as a drive mechanism for the oscillating mechanism is a stepping motor. Nevertheless, the stepping motor is a known suitable type of motor to use as a driving means for the oscillating means. It is known in the art to provide an enhance level of control in the speed of oscillation thus provide for greater optimization of the treatment distribution.

20. Claims 114-116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Kato and Rebold as applied to claims 111-113 above, and further in view of Thoms.

The teachings of Seki et al, Shinko, Kato and Rebold were discussed above.

All failed to teach that their apparatus comprise cams, link mechanisms, and control motors.

Thoms teaches an etchant distribution apparatus wherein a motor 30 drives a crank 51(cam) which connects to arms (links) 52 and 57. The combination of crank and arms with pivotal plates 53 and 54 cause the nozzles to oscillate independently.

Thus, it would have been obvious at the time of the claimed invention to modify the apparatus resulting from the combined teachings of Seki et al, Shinko, Kato and Rebold to have cam, links, and control motors as taught by Thoms.

21. Claims 127-135, 149, and 160 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinko in view of Thoms as applied to claim 84 above, and further in view Kato and Rebold.

The teachings of Shinko and Thoms were discussed above.

Both fail to teach the pressure gauges and circuits to control the output of the pumps.

Kato teaches pressure gauges 228 in order to monitor the pressure of the processing fluid.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide pressure gauges in the apparatus of Shinko and Thoms.

Regarding claim 129, 132, and 134 : Shinko, Thoms and Kato fail to teach circuits controlling the outputs of the pumps.

Rebold teaches an inverter circuit as a speed control device for DC motors. Rebold teaches in col.3 lines 28-37 that speed control circuits such as the inverter circuit (see the context of claim 7 of Rebold) drives the motor at a constant speed regardless of the mechanical load imposed on the motor.

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Thus, it would have been obvious for one of ordinary skill at the time of the claimed invention to modify the apparatus of Shinko modified by Thoms and Kato with the teachings of Rebold to control the speed of the motor in the pump which consequently controls the flow of the treating fluids.

Regarding claim 130: Recall Thoms teaches an etchant distribution apparatus wherein a motor 30 drives a crank 51(cam) which connects to arms (links) 52 and 57. The combination of crank and arms with pivotal plats 53 and 54 cause the nozzles to oscillate independently.

22. Claims 136 and 161 are rejected under 35 U.S.C. 103(a) as being unpatentable over or Shinko in view of Thoms as applied to claim 84 above, and further in view of Rebold.

The teachings of Shinko and Thomas were discussed above.

Neither teaches the use of circuits to control the output of the pumps.

Rebold teaches an inverter circuit as a speed control device for DC motors. Rebold teaches in col.3 lines 28-37 that speed control circuits such as the inverter circuit (see the context of claim 7 of Rebold) drives the motor at a constant speed regardless of the mechanical load imposed on the motor.

Thus, it would have been obvious for one of ordinary skill at the time of the claimed invention to modify the apparatus of Shinko modified by Thoms with the teachings of Rebold to control the speed of the motor in the pump which consequently controls the flow of the treating fluids.

Regarding the plurality of pumps, it was held by In re Harza 124 USPQ 38 (CCPA 19600 that it is obvious to duplicate parts.

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Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the circuits of Rebold for a plurality of pump in the apparatus of Shinko modified by Thoms.

23. Claims 137 and 162 are rejected under 35 U.S.C. 103(a) as being unpatentable over or Shinko in view of Thoms and Rebold as applied to claim 136 above, and further in view of Chih-Peng.

The teachings of Shinko, Thoms, and Rebold have been discussed above.

All fail to teach the treating solution being blown to the substrate.

Chih-Peng teaches an etching device wherein etchant nozzles 214, 224a, 224b, and 224c and air nozzles 226a are provided. Col. 5 lines 7-18 teaches that air is blown onto the substrate.

The motivation to provide a step of conveying the substrate while oscillating the nozzle pipes and blowing the treating solution to the substrate is that as cited in col. 6 lines 10-14 that the etchant is smoothly removed.

Thus, it would have been obvious to provide the step of blowing the treatment solution onto the substrate.

Since the nozzles are able to oscillate independently at varied angles and speed the nozzles are obviously capable of meeting this limitation.

24. Claim 138 and 163 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinko in view of Thoms, Rebold, and Chih-Peng as applied to claim 137 above, and further in view of Kato.

The teachings of Shinko, Thoms, Rebold, and Chih-Peng were discussed above.

All fail to teach pressure gauges.

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Kato teaches pressure gauges 228 in order to monitor the pressure of the processing fluid.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide pressure gauges in the apparatus of Shinko, Thoms, Rebold, and Chih-Peng.

Regarding the plurality of pumps and gauges, it was held by *In re Harza* 124 USPQ 38 (CCPA 19600 that it is obvious to duplicate parts.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the circuits of Rebold for a plurality of pumps and gauges in the apparatus of Shinko modified by Thoms.

25. Claims 77 and 150 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki et al or Shinko in view of Tamura et al (US 4,233,108) and Koichi et al, as applied in claim 75, above in further view of Chih-Peng.

The teachings of Seki et al, Shinko, Tamura, and Koichi et al were discussed above.

All fail to teach the treating solution being blown to the substrate.

Chih-Peng teaches an etching device wherein etchant nozzles 214, 224a, 224b, and 224c and air nozzles 226a are provided. Col. 5 lines 7-18 teaches that air is blown onto the substrate.

The motivation to provide a step of conveying the substrate while oscillating the nozzle pipes and blowing the treating solution to the substrate is that as cited in col. 6 lines 10-14 that the etchant is smoothly removed.

Thus, it would have been obvious to provide the step of blowing the treatment solution onto the substrate.

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Since the nozzles are able to oscillate independently at varied angles and speed the nozzles are obviously capable of meeting this limitation.

Allowable Subject Matter

26. Claims 92, 97, 103, 110, 119-126, and 159 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

27. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to teach or fairly suggest a first and second flexible bellows as claimed in claim 92.

The prior art of record fails to teach or fairly suggest flexible wires as claimed in claim 97.

The prior art of record fails to teach or fairly suggest a means for storing dimensions of the printed wiring board as claimed in claims 103, 110, and 159.

The prior art of record fails to teach or fairly suggest a means for storing data as claimed in claims 119-126.

28. Claims 139-141 and 164-166 are allowed.

29. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to teach or fairly suggest

The prior art of record fails to teach or fairly suggest a means for storing and calculating data as claimed in claims 139-141.


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30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 571-272-1438.

The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sylvia R MacArthur
Patent Examiner
Art Unit 1763

June 23, 2004